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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,100	01/13/2005	Yoshifumi Sugito	264199US0PCT	7104
22850	7590	08/03/2007		
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER FORTUNA, ANA M	
			ART UNIT 1723	PAPER NUMBER
			NOTIFICATION DATE 08/03/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/521,100

Applicant(s)

SUGITO ET AL.

Examiner

Ana M. Fortuna

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>5/3/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

IDS filed on 5/3/2005 have been considered by the Examiner, a copy of signed Form 1449 is attached for your records.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 3, 4, 5, 8, 9, 13, 14, 16, 17, 18 are rejected under 35

U.S.C. 102(e) as being anticipated by Davis (US 7,083,730).

Davis teaches desalting raw water, e.g. sea water, by reverse osmosis to concentrate the raw water and produce a permeate of purified water, further treating the concentrate to remove salts (water soluble) e.g. by electrodialysis membrane is disclosed in Davis (Fig 4A, abstract, Figure 1, Fig. 6, column 1, lines 16-18, column 4, lines 36-68, column 5, lines 39, column 6, lines 61-68, column 7, lines 1-3, column 17, second paragraph).

As to claim 2, the separations are conducted in series and at the same time e.g. continuously (see figures), no intermedia collection of retentate is performed, the concentrate from the reverse osmosis membrane (200) passes to the

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electrodialysis unit (300) directly and tat passage is maintained through the process. As to claim 3, the claimed slats and an inherent part of sea water; some of the salts removed in the process are magnesium, sodium, calcium and divalent salts (column 114, lines 6-59, column 17, last paragraph bridging column 18, through line 64).

Davis further discloses the salt concentration percentage of claim 4, as being 23.0 % to 24.74 % by weight (example 1, column 19, line 45 through column 20, line 19).

A fist step of salt separation by reverse osmosis is taught by Davis, and discussed above (see figures).

Limitations of claims 8-9 are discussed above, e.g. sea water, which containing valuable salts and other materials.

As to claim 14, the system including at lest one reverse osmosis membrane, and an evaporator is disclosed in Davis (elements 200, 500).

The "desalted water" of claims 12 and 16-18 is disclosed in Davis, e.g the product from the Ro membrane (element 250). The product products of claims 10, 11, or 12, as claimed in claims 17-18, are water or purified water, which composition is not limited to the process of producing it, and can be produced by other process steps combination, or by reverse osmosis alone.

In re Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972).

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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3. Claims 1, 2, 3, 7, 8, 9, 13, 14, rejected under 35 U.S.C. 102(b) as being anticipated by Hassan (US 6,508,936). Hassan teaches treating sea water by nanofiltration membranes, the concentrate from the first stage nanofiltration in further concentrated I subsequent nanofiltration membranes, the permeates are collected for further treatment to produce purified water (abstract, Fig. 2, nanofiltration section). Further combination with reverse osmosis ad evaporators is shown in the figure (column 4, lines 32-68, column 5, lines 1-36, column 7, lines 24-69). The water produced by the process of claim 1 is also disclosed in Hassan, e.g. collected permeates, or combination of permeates fro the NF stages.

4. Claims 1, 3, 5, 8, 9 and 13-14 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 61-061690 A (hereinafter '690). Reference '670 (discussed in the written opinion) teaches a process for producing freshwater from seawater, e.g. desalination process wherein, after separating freshwater from sea water by flash distillation (step), and treating the concentrate seawater by reverse osmosis membrane to separate freshwater (step 2), which is equivalent to the combination of evaporation and reverse osmosis as claimed in claim 5.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 7,083,730) in view of JP 08-276122 or Fukutomi et al (US.6, 484,887). Davis, discussed above as applied to claim 1, teaches the combination of reverse osmosis and electrodialysis for steps (1) and (2). Futukomi et al ('887) teaches a mosaic membrane and using the membrane in electrodialysis, and for desalting sea water (abstract, column 9, last paragraph through column 10, line 24). It would have been obvious to one skilled in the art at the time this invention was made would have been motivated to use the mosaic membrane of patent '887 for further desalting the concentrate water from the reverse osmosis concentrate is patent '887, e.g. to remove salts from the water and to produce a concentrate (concentrated in some salts), and a diluate stream. As to claim 10, further includes the limitation of "ocean deep water" (sea water". The term "seawater", of the prior art is not limited and includes ocean water from the sea at any level of the sea. Patent '887 further teaches collecting valuable metals from sea water, which suggests removing the water from any area of the ocean that contains the metals. The skilled in the art at the time this invention was made applying the techniques discussed above can predict the production of purified water by reverse osmosis and retention of salts as concentrate from "deep ocean water", or sea water at a deep location within the sea.

JP'122 also teaches desalting sea water by a charged-mosaic membrane (paragraphs [0002] and [004]), therefore, the skilled in the art at the time this invention was made can be motivated to use the mosaic membrane either alone

or in combination with other desalting techniques, or substitute the charged membrane in an electrodialysis device, as suggested in patent '887, by the same inventor.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-061690 A (hereinafter '690) as applied to claim 14 above, and further in view of JP 09-248429 ('429), and JP 63-287497 (497). Reference '690 teaches the combination including reverse osmosis and evaporation combination for concentration sea water and to produce purified water, as discussed above. The specific vacuum evaporator of claim 15 is not though in this reference.

Reference '429 indicates that means such as vacuum distillation (decrease vacuum distillation and flash distillation as equivalent means for distilling raw water (abstract, and paragraph [0025]).

Reference '497 discloses a centrifugal thin-membrane vacuum distillation device as distillation device (page 4, right column, lines 5-9). Therefore, since both flash distillation and vacuum distillation are distillation means known before the present application, and a centrifugal thin-membrane vacuum distillation device was also known for vacuum distillation, the use of vacuum distillation, such as centrifugal thin-membrane vacuum distillation instead of flash distillation as the distillation means in the invention of patents '429 or '690 is a suitable option available to a person skilled in the ordinary art, and its combination with reverse osmosis an/or electrodialyzers is further suggested in reference '429 (abstract).

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 7,083,730) in view of JP 08-276122 or Fukutomi et al (US.6, 484,887)

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as applied to claim 6 above, and further in view of Hassan (US 6,508,936) as applied to claims 1 and 7 above, JP 2001029754. Davis (US 7,083,730) discussed above teaches nanofiltration connected to an electrodialysis membrane and reverse osmosis as the first separation stage (see figures).

Reference '112 and '887 both teach the use of charged mosaic membrane for treating sea water, as discussed above. The use of nanofiltration membrane in place of nanofiltration membrane or in combination with the mosaic membrane is not disclosed.

Hassan ('936) teaches softening sea water by nanofiltration and concentrating the concentrates in subsequent nanofiltration units, as discussed above. Hassan lacks the combination of NF membranes with mosaic (charged) membranes.

JP'754 discloses the use of nanofiltration membranes to desalt salt water (seawater) ([0001]).

It would have been obvious to one skilled in the art at the time this invention was made to use nanofiltration membrane separation in the treatment of sea water as first step in the process as discussed in Hassan and reference '754, to soften the water by removing divalent ions from sea water, such as, calcium, and magnesium. The treated concentrate in a charged membrane is expected to concentrate divalent ions retained by the nanofiltration (NF) membrane in the first step, with production of diluted and concentrate solutions containing the divalent ions, and a minor amount of monovalent ions because the large percentage of monovalent ions pass through the NF membrane

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It would have been further obvious to one skilled in this art at the time this invention was made to combine the mosaic membrane of JP'122 and /or '887 to further concentrate sea water from the nanofiltration membrane, since the membrane is suggested for desalination. Furthermore, substituting the charged membrane in the electrodialysis membrane unit of patent '730 by the mosaic membrane which is also charged and have seawater salts retention capabilities; the membrane of patent'887 is further suggested for electrodialysis units as discussed in the paragraphs above.

Regarding to the term "ocean deep water", Hassan teaches "ocean water", which applies to water at any depth in the ocean (or sea water in general).

9. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-0616690 in view of GB 2 234448 A and JP08-276122 or 7,083,730). Reference '690 teaches reverse osmosis and evaporation combination (page 2, left column, lines 8-12). Patent '448 also teaches vacuum evaporation and conventional reverse osmosis for desalination of sea water (pages 1-2 and claims). These references lack the combination with mosaic membranes, which are suggested for sea water desalination and electrodialysis by patent '730 (discussed above, see figures), and JP '122, also discussed above. It Would have been obvious to one skilled in this art at the time this invention was made to combine these techniques for concentrating salts in seawater and producing a permeate or distilled water by evaporation, as disclosed in GB '448. Further treatment of the concentrate by a further desalination membrane, as the mosaic membrane it would have been obvious to one skilled in this art the time the

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invention was made to produce a cumulative desalination stage and water or diluate recovery, as suggested by patent 730, e.g when the membrane is used in electrodialysis unit. Furthermore, the skilled artisan knowing this teaching can be motivated to combine the desalting techniques to produce water of a desired quality and salts of various levels of concentration that can be predicted depending on the treatment time, recirculation (in the case of reverse osmosis), and the number of membranes used in each stage. Combining reverse osmosis and evaporation in either way is known in this art as discussed above, by further combination with a charged membrane the skilled in this art can predict an improvement in the degree of concentration of the concentrate, or improvement in the quality of the treated water.

The term "deep ocean water" is considered equivalent to "sea water", because sea water and ocean water are considered to be equivalent in the art, and is not limited to water at the surface of the sea or at the bottom, but to all water that comes from the sea.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Additional references cited on 892 teach sea water treatment by nanofiltration to produce drinking water by nanofiltration stages, apparatus for treating water by combining nanofiltration and or reverse osmosis.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M. Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Sample can be reached on (571) 272-1151. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ana M Fortuna/
Primary Examiner
Art Unit 1723

AF
July 26, 2007